REMARKS

Applicants respectfully request reconsideration of the above-identified application in view of the proposed amendment above and the remarks below.

Claims 18, 21-29 and 76-78 are herein proposed to be canceled. Claims 10, 13, 16-17, 72-73 and 75 are herein proposed to be amended. No new claims are herein proposed to be added. Therefore, upon entry of the present amendment, claims 1-8, 10-17, 19-20, 58-61 and 71-75 will be pending and under active consideration.

Claim 17 stands objected to because "the formula in claim 17 which has an R5 attached to the CH2 group within parenthesis is in error because the carbon in the CH2 group is shown as having 5 bonds." In response to the foregoing objection, Applicants have amended claim 17 so that the formula in question has been replaced. Consequently, the objection has been overcome and should be withdrawn.

Claims 1-8, 10-15, 17-28, 58-61 and 71-75 stand rejected under 35 U.S.C. 103(a) "as being unpatentable over Mickols (853) in view of Marinaccio et al. (US 4,915,839)." In support of the rejection, the Patent Office states the following:

> Claims 1 and 58: Mickols teaches a reverse osmosis membrane comprising a microporous support, a polyamide layer on the microporous support (col 3 lines 10-20) and a hydrophilic coating of a crosslinked epoxy compound (col 4 lines 25-46) as in claim 1. However, Mickols teaches a di-epoxide, not an epoxide having at least three epoxy groups. Marinaccio teaches three epoxy groups in cross-linking a membrane (see structures in col 12). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Marinaccio in the teaching of Mickols for having cationic, anionic or zwitterion membranes because it makes the membrane sanitizable or sterilizable, and capable of capturing anionic, cationic and other particles smaller than the effective pore size of the membrane (Marinaccio col 5 line 55 - col 6 line 11).

Cross-linking with the help of a cross-linking compound - see Marinaccio col 9 line 61 - col 14 line 10); cross-linked through self polymerization: inherent from Mickols in view of Marinaccio; similar reagents as used by the applicant should produce similar products. The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness." In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995)(affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also In re Grasselli, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983). Re claim 58, Mickols teaches a microporous membrane with a hydrophilic coating, as above (claim open-ended).

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Claim 11: cross-linked through self-polymerization: inherent from Mickols in view of Marinaccio; similar reagents as used by the applicant should produce similar products. The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness." In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995)(affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also In re Grasselli, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983).

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Claims 19, 20 and 28: Marinaccio may not be listing the exact carboxylic or sulfonic acids listed as in these claims, but teaches polyfunctional carboxylic or sulfonic acids in col 13 line 55 - col 14 line 11, which would afford anionic (negative charged) membrane, or compounds having zwitter ions in col 14 lines 55-68, as recited in the specification page 19, 4th paragraph and page 20, 1st para, and therefore, equivalent. In this case, the prior art element: (A) performs the identical function specified in the claim in substantially the same way, and produces substantially the same results as the corresponding element disclosed in the specification. Kemco Sales, Inc. v. Control Papers Co., 208 F.3d 1352, 54 USPQ2d 1308 (Fed. Cir. 2000). (B) is not excluded by any explicit definition provided in the specification

for an equivalent. A person of ordinary skill in the art would have recongized the interchangeability of the element shown in the prior art for the corresponding element disclosed in the specification. (Citations omitted.) Also, a prima facie case of obviousness may be made when chemical compounds have very close structural similarities and similar utilities. "An obviousness rejection based on similarity in chemical structure and function entails the motivation of one skilled in the art to make a claimed compound, in the expectation that compounds similar in structure will have similar properties." In re Payne, 606 F.2d 303, 313, 203 USPQ 245, 254 (CCPA 1979). See In re Papesch, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) and In re Dillon, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1991) (discussed in MPEP § 2144) for an extensive review of the case law pertaining to obviousness based on close structural similarity of chemical compounds. See also MPEP § 2144.08, paragraph II.A.4.(c). "[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." (Citations omitted.)

Claims 18 and 27: cross-linking agent is diethylene triamine, etc - col 11 lines 20-30. Applicant has deleted common amines listed by the reference from the instant claims by this amendment. However, since the applicant has a large group of amines claimed, the compounds presented in the claim would be considered equivalent to the compounds in the reference, unless applicant can show substantial and unobvious difference in the resulting membrane product(s). Examiner also could not locate any of these claimed amines in the working examples provided by the applicant.

In all the above claims, as in claim 1, it would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Marinaccio in the teaching of Mickols for having cationic, anionic or zwitterion membranes because it makes the membrane sanitizable or sterilizable, and capable of capturing anionic, cationic and other particles smaller than the effective pore size of the membrane (Marinaccio col 5 line 55 - col 6 line 11).

Claims 71, 72, 74 and 75: four epoxy groups: Marinaccio uses poly epoxies - therefor has more than 4 epoxy groups (col 4 - formula). The compounds listed in claim 72 and 75 could be represented by the formulae in col 12, or are their equivalent, unless

> the applicant can show substantial and non-obvious difference in the resulting membrane products.

Insofar as the foregoing rejection pertains to claims 18 and 21-28, the rejection is moot in view of Applicants' cancellation herein of claims 18 and 21-28. Insofar as the foregoing rejection pertains to claims 1-8, 10-15, 17, 19-20, 58-61 and 71-75, Applicants respectfully traverse the foregoing rejection.

Claim 1, from which claims 2-8, 11-15, 17, 19-20 and 71-72 depend, recites "[a] composite polyamide reverse osmosis membrane comprising:

(a) a microporous support;

(b) a polyamide layer on said microporous support; and

(c) a hydrophilic coating on said polyamide layer, said hydrophilic coating being made by (i) applying to the polyamide layer a quantity of a polyfunctional epoxy compound, said polyfunctional epoxy compound comprising at least three epoxy groups, and (ii) then, cross-linking the polyfunctional epoxy compound in such a manner as to yield a water-insoluble polymer, wherein said polyfunctional epoxy compound is cross-linked through at least one of self-polymerization and the help of a cross-linking compound, said cross-linking compound differing from said polyamide layer."

The Patent Office is apparently contending (i) that Mickols teaches the composite polyamide reverse osmosis membrane of claim 1, except for the teaching of a polyfunctional epoxy compound comprising at least three epoxy groups; (ii) that Marinaccio et al. discloses a polyfunctional epoxy compound comprising at least three epoxy groups; and (iii) that it would have been obvious at the time of the invention to a person of ordinary skill in the art to have replaced the Mickols di-epoxide

compounds with the Marinaccio compounds. For at least the reasons provided below, Applicants respectfully disagree with the Patent Office's line of reasoning.

First, Mickols differs from the composite polyamide reverse osmosis membrane of claim 1 with respect to more than just the number of epoxy groups in the polyfunctional epoxy compound. More specifically, claim 1 requires there to be a hydrophilic coating on the polyamide layer of the membrane, the hydrophilic coating being made by (i) applying to the polyamide layer a quantity of a polyfunctional epoxy compound comprising at least three epoxy groups, and (ii) then, cross-linking the polyfunctional epoxy compound in such a manner as to yield a water-insoluble polymer, wherein said polyfunctional epoxy compound is cross-linked through at least one of **self-polymerization** and the **help of a cross-linking compound, said cross-linking compound differing from said polyamide layer**.

By contrast, Mickols does not teach or suggest applying a polyfunctional epoxy compound to the polyamide layer of the membrane and **then cross-linking** the polyfunctional epoxy compound, either by **self-polymerization** or by **a cross-linking compound differing from the polyamide layer** of the membrane, to form a water-insoluble polymer on the polyamide layer. Instead, Mickols discloses **grafting or covalently bonding** polyalkylene oxide compounds **directly to functional groups of the polyamide layer**.

As noted in previous correspondence to the Patent Office, because the polyalkylene oxide compounds of Mickols are grafted directly to the polyamide layer by covalently bonding between said polyalkylene oxide compounds and exposed functional groups of the polyamide layer, the quantity of polyalkylene oxide compound that can be bonded to the polyamide layer is dependent upon the quantity of functional groups in the polyamide layer that are available for bonding. Such

a quantity of functional groups available for bonding is typically relatively small. By contrast, the claimed membrane does not require any bonding between the polyfunctional epoxy compounds applied to the polyamide membrane and the polyamide membrane. Instead, the polyfunctional epoxy compounds are cross-linked to one another, by self-polymerization and/or by a cross-linking compound other than the polyamide layer.

Moreover, in addition to the fact that Mickols does not teach or suggest cross-linking the polyfunctional epoxy compounds by self-polymerization or by a cross-linking compound other than the polyamide layer, there is no basis for replacing the Mickols compounds with the Marinaccio compounds. The Patent Office is apparently operating under the assumption that the Marinaccio compounds are sufficiently structurally similar to the Mickols compounds that they may be regarded as interchangeable. Applicants respectfully disagree that the Mickols and Marinaccio compounds are of sufficiently close structural similarity that they may be considered interchangeable for purposes of obviousness.

Furthermore, as noted in previous correspondence to the Patent Office, the Marinaccio compounds are used in an entirely different manner and for an entirely different purpose than the Mickols compounds. Consequently, one of ordinary skill in the art would not have been motivated to use them interchangeably. More specifically, whereas the polyfunctional epoxy compounds of Mickols are **covalently bonded directly to a polyamide layer** of a composite polyamide reverse osmosis membrane for the alleged purpose of **improving the fouling resistance** of the membrane, the membrane of Marinaccio et al. does not even include a polyamide layer, and the Marinaccio polyfunctional epoxy compounds are coated **directly onto the microporous support** in order to improve, among other things, the **filtering capacity** of the membrane - not to affect the fouling

resistance of the membrane. (As can readily be appreciated, because the membrane of Marinaccio et al. does not include a polyamide layer, there is a great need to improve the filtering capacity of the membrane if the membrane is to be used for the types of applications aspired to by Marinaccio et al.. Such a need, however, is greatly diminished in the case of Mickols, which already includes a polyamide layer.) Consequently, in view of the fact that the polyfunctional epoxy compounds of Marinaccio et al. are being used for a different purpose and in a different manner than the polyfunctional epoxy compounds of Mickols, one of ordinary skill in the art would not have been motivated to replace one with the other.

Claim 10 is patentable over the subject combination of references for at least the reasons given above for claim 1. In addition, Applicants note that the specific compounds recited in claim 10 are neither taught nor suggested by the references.

Claim 58 is patentable over the applied combination of references for similar reasons to those discussed above for claim 1. In addition, as noted above, Mickols discloses a composite polyamide membrane in which polyalkylene oxide compounds are covalently bonded to a polyamide layer. Claim 58, however, recites that the hydrophilic coating is applied **directly** to the microporous support. Consequently, Mickols differs from the claimed membrane in that Mickols does not include a hydrophilic coating of the type claimed applied **directly** to the microporous support. (In fact, because the polyalkylene oxide compounds of Mickols are covalently bonded to functional groups in the polyamide layer, there would have been no reason for one ordinary skill in the art to have modified Mickols to remove the polyamide layer since the microporous support has substantially fewer functional groups for bonding the polyalkylene oxide compounds.)

Accordingly, for at least the above reasons, the foregoing rejection should be withdrawn.

Claims 16 and 29 stand rejected under 35 U.S.C. 103(a) "as being unpatentable over Mickols (853) in view of Marinaccio et al (US 4,915,839) as in claim 13 above and further in view of Linder (US 4,778,596)." In support of the rejection, the Patent Office states the following:

> Mickols in view of Marinaccio does not teach using a polyol as crosslinking compound as in the instant claims. Linder teaches coating a semipermeable membrane with a hydrophilic coating comprising an epoxy compound and a polyol such as PVA (col 4 lines 50-68; col 5 lines 1-35; col 7 lines 5-40 and 45-50; col 9 lines 43-55; col 10 lines 63-68). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Linder in the teaching of Mickols in view of Marinaccio for making a hydrophilic cross-linked reverse osmosis membrane with improved solvent, pressure and temperature resistance (see abstract).

Insofar as the foregoing rejection pertains to claim 29, the rejection is moot in view of Applicants' cancellation herein of claim 29. Insofar as the foregoing rejection pertains to claim 16, Applicants respectfully traverse the foregoing rejection.

Claim 16 depends from claim 1. Claim 1 is patentable over Mickols in view of Marinaccio et al. for at least the reasons given above. Linder et al. fails to cure all of the deficiencies of the combination of Mickols and Marinaccio et al. Therefore, based at least on its dependency from claim 1, claim 16 is patentable over the subject combination of Mickols, Marinaccio et al. and Linder et al. Moreover, Applicants respectfully submit that none of the compounds listed in claim 16 are taught or suggested by the subject combination of references.

Accordingly, for at least the above reasons, the foregoing rejection should be withdrawn.

In conclusion, it is respectfully submitted that the present application is now in condition for allowance. Prompt and favorable action is earnestly solicited.

If there are any fees due in connection with the filing of this paper that are not accounted for, the Examiner is authorized to charge the fees to our Deposit Account No. 11-1755. If a fee is required for an extension of time under 37 C.F.R. 1.136 that is not accounted for already, such an extension of time is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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Dated: June 25, 2004

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on June 25, 2004.

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